HW7 (Due 2018/05/07)

1. (**Quick Sort**) Write a program to sort a set of *n* numbers by quick sort algorithm (shown below), where each number is ranged between -32768 and 32767 and $1 \leq n \leq 10$. The program prompts users to enter *n*, sorting direction (1 for ascending and 2 for descending) and the numbers. Function **qsort()** should be used in the program for sorting numbers.

Algorithm Quicksort (f,l)
Input: $x_f, x_{f+1}, \ldots, x_l$.
Output: The sorted sequence of $x_f, x_{f+1}, \ldots, x_l$.

```
If f ≥ l then Return
X := x_f
i := f+1
j := l
While i ≤ j do
Begin
        While x_j ≥ X and j ≥ f + 1 do
                j := j − 1
        While x_i ≤ X and i ≤ l do
                i := i + 1
        if i < j then swap x_i and x_j
End
swap x_f and x_j
Quicksort( f , j − 1)
Quicksort( j + 1 , l )
```

Sample I/O: (The italics for program output and boldfaces for user input)

Please input n and sorting direction (1 for ascending and 2 for descending):
5 1
Please input 5 numbers:
34 12 45 7 23
The sorted results in ascending order:
7 12 23 34 45

Please input n and sorting direction (1 for ascending and 2 for descending):
5 2
Please input 5 numbers:
34 12 45 7 23
The sorted results in ascending order:
45 34 23 12 7

Bonus:

You can get bonus if your program provides additional capability to sort *n* strings by quick sort algorithm, where each string contains at most 20 characters and $1 \leq n \leq 10$. A function should be used in the program for sorting.

Sample I/O: (The italics for program output and boldfaces for user input)

Please input n and sorting direction (1 for ascending and 2 for descending):
5 1
Type of data (1 for numbers and 2 for strings):
1
Please input 5 numbers:
34 12 45 7 23
The sorted results in ascending order:
7 12 23 34 45

Please input n and sorting direction (1 for ascending and 2 for descending):
5 1
Type of data (1 for numbers and 2 for strings):
2
Please input 5 strings:
a34 n12 t45 b7 c23
The sorted results in ascending order:
a34 b7 c23 n12 t45